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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/601,301

06/13/2003

Seiji Sarayama

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5867

7590

05/03/2006

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EXAMINER

HO, TU TU V

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 05/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/601,301

Applicant(s)

SARAYAMA ET AL.

Examiner

Tu-Tu Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 94-106 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 96-106 is/are allowed.
- 6) ☒ Claim(s) 94 and 95 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/590,063.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Document Code REM, filed 04/07/2006, with respect to the rejection(s) of claim(s) 94-95 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kidoguchi et al. U.S. Patent 6,136,626, Okumura U.S. Patent 6,456,640, and DiSalvo U.S. Patent 5,868,837.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. **Claims 94-95** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidoguchi et al. U.S. Patent 6,136,626 (the '626 reference) in view of Okumura U.S. Patent 6,456,640 (the '640 reference) and further in view of DiSalvo U.S. Patent 5,868,837 (the '837 reference, cited in the parent application).

The '626 reference discloses an optical semiconductor device substantially as claimed including a substrate, but instead of teaching a bulk crystal substrate of GaN as claimed, the reference discloses a sapphire substrate.

Specifically, in reference to **claim 94**, the '626 reference discloses an optical semiconductor device comprising:

a bulk sapphire substrate (32, Fig. 1, col. 6, lines 44-67);

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lower and upper cladding layers (36, 40) formed epitaxially on said bulk sapphire substrate (col. 8, lines 34-45); and

an active layer (38) formed epitaxially between said lower and upper cladding layers (col. 8, lines 34-45).

However, as noted above, the reference, instead of teaching a bulk crystal substrate of GaN as claimed, discloses a sapphire substrate.

Okumura, in also disclosing an optical semiconductor device, teaches that a GaN substrate is advantageous over a sapphire substrate in that it has a lattice constant which is closer to that of a gallium nitride type semiconductor material deposited thereon (col. 7, lines 50-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the '626 reference's device such that the substrate is a GaN substrate in place of the sapphire substrate. One would have been motivated to make such a change in view of the teachings in Okumura that a GaN substrate is advantageous over a sapphire substrate in that it has a lattice constant which is closer to that of a gallium nitride type semiconductor material deposited thereon, in the instant case such as, for example, layers 34,36,38,40,42.

Nevertheless, both the '626 reference and Okumura do not appear to disclose how to form such a GaN substrate.

DiSalvo, in also disclosing an optical semiconductor device, provides such a deficiency. Specifically, DiSalvo teaches a bulk crystal substrate of GaN comprising a slab of GaN single crystal produced by a process comprising the steps of:

forming a molten flux of a volatile metal element (sodium metal, column 4, lines 20-35) in a pressurized reaction vessel confining therein said molten flux together with an atmosphere containing N (nitrogen), such that said

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molten flux includes Ga in addition to said volatile metal element (column 4, EXAMPLE II, particularly "the nitrogen pressure in the autoclave was increased to 1,000 psi");

growing GaN in the form of a single crystal body in said molten flux; and

supplying a compound containing N directly into the atmosphere in said reaction vessel from a source located outside said reaction vessel (column 4, lines 31-52, particularly: "The autoclave was sealed, inserted into a furnace, and attached to a nitrogen line")

because such a process is formed at low temperatures and is economically sound (col. 1, lines 25-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the '626 reference's device using the GaN substrate taught by Okumura as detailed above, which GaN substrate is formed by the DiSalvo's teachings. One would have been motivated to make such a change because such change produces a device with matched lattice constants and which is economically sound.

Referring to **claim 95**, as the DiSalvo's process for forming the bulk crystal substrate of the slab of GaN is about the same as that as claimed, particularly the pressurized N-containing atmospheric condition, said DiSalvo's GaN single crystal slab should also have a stoichiometric composition in the thickness direction thereof as claimed.

Allowable Subject Matter

3. Claims 96-106 are allowable over the prior art of record.

The examiner's statement of reasons for the indication of allowable subject matter was indicated in the office action mailed 12/15/2005.

Conclusion

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4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 7:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tu-Tu Ho
April 26, 2006